

the location adjacent to the building entrance whereby surges are shunted to the building ground through said metal-oxide varistor and said gas-discharge tube.

Claim 2. A surge protector as recited in claim 1 wherein the metal-oxide varistor is coupled to the power line through a series-connected fuse.

Claim 3. A surge protector as recited in claim 1 further comprising a second metal-oxide varistor having two electrodes and being coupled at one electrode to the power line at the location adjacent to the building entrance, and wherein the gas-discharge tube has a second line electrode connected to the other electrode of the second metal-oxide varistor.

Claim 4. A surge protector as recited in claim 1 wherein the second metal-oxide varistor is coupled to the power line through a series-connected fuse.

Claim 5 (First Amendment). A permanently-connected building-entrance shunting surge protector for multi-phase power lines, said protector comprising:

a first metal-oxide varistor having two electrodes and being coupled at one electrode to a first power line at a location adjacent to a building entrance;

a first gas-discharge tube having a line electrode connected to the other electrode of the first metal-oxide varistor and having a ground electrode connected to a building ground at the location adjacent to the building entrance whereby surges on the first power line are shunted to the building ground through said first metal-oxide varistor and said first gas-discharge tube;

a second metal-oxide varistor having two electrodes and being coupled at one electrode to a second power line at the location adjacent to the building entrance, and

a second gas-discharge tube having a line electrode connected to the other electrode of the second metal-oxide varistor and having a ground electrode connected to the building ground at the location adjacent to the building entrance whereby surges on the second power line are shunted to the building ground through said second metal-oxide varistor and said second gas-discharge tube.

Claim 6. A surge protector as recited in claim 5 further comprising a coupling capacitor connected between the

two power lines at the location adjacent to the building entrance.

Claim 7. A surge protector as recited in claim 5 wherein each of the metal-oxide varistors is coupled to a power line through a series-connected fuse.

Claim 8 (First Amendment). A permanently-connected building-entrance shunting surge protector for multi-phase power lines, said protector comprising:

a first protector sub-circuit connected between a first power line and a building ground at a location adjacent to a building entrance; and

a second protector sub-circuit connected between a second power line and the building ground at the location adjacent to a building entrance;

wherein each protector sub-circuit includes two metal-oxide varistors each having two electrodes and each being coupled at one electrode to a power line, and a gas-discharge tube having two line electrodes each connected to the other electrodes of the metal-oxide varistors and having a ground electrode connected to the building ground at the location adjacent to the building entrance whereby surges are shunted to

building ground through the appropriate protector sub-circuit respectively.

Claim 9. A surge protector as recited in claim 8 wherein each of the metal-oxide varistors is coupled to a power line through a series-connected fuse.

Claim 10. A surge protector as recited in claim 8 further comprising a third protector sub-circuit connected between the first power line and the building ground, and a fourth protector sub-circuit connected between the second power line and the building ground.

Claim 11. A surge protector as recited in claim 8 further comprising a coupling capacitor connected between the two power lines at the location adjacent to the building entrance.

Claim 12. A surge protector as recited in claim 8 providing AC power surge protection of greater than 10 kilovolts open circuit and 40,000 amperes short circuit.

Claim 13. A surge protector as recited in claim 8 wherein the protector is located within 2 meters of the building ground.

Claim 14. A surge protector as recited in claim 8 wherein the inductance between the protector and the building ground is less than 2.5 microhenries.

Claim 15. A permanently-connected building entrance shunting surge protector for a power line to a building having a building ground at a location adjacent to a building entrance,

\_\_\_\_\_ said protector comprising a protector sub-circuit, said protector sub-circuit comprised of a metal-oxide varistor and a gas-discharge tube, said metal-oxide varistor and said gas-discharge tube being connected in series between the power line and the building ground at a location adjacent to the building entrance whereby surges on the power line are shunted to the building ground through said series-connected metal-oxide varistor and gas-discharge tube.

Claim 16. The surge protector as recited in claim 15 characterized in that the gas-discharge tube has two line electrodes and there are two metal-oxide varistors in the

protector sub-circuit, with each of the two metal-oxide varistors connected to one electrode of the two line electrodes of the gas-discharge tube respectively, so as to provide paralleling of the metal-oxide varistors between the power line and the building ground through the gas-discharge tube.

Claim 17. The surge protector as recited in claim 15 characterized in that the power line is a multi-phase power line and that there are multiple protector sub-circuits connected in series between the various phases of the power line and the building ground respectively.

Claim 18. The surge protector as recited in claim 15 characterized in that said metal-oxide varistor in series with the gas-discharge tube is connected to the power line.

#### R E M A R K S

On July 31, 2002, the USPTO issued an office action rejecting claims 1, 3, 5 and 6 under 35 USC 103a as being unpatentable over Chaudhry U.S. 6,282,075, rejecting claims 2, 4, 7 and 9 under 35 USC 103a as being unpatentable over Chaudhry U.S. in view of Kapp U.S. 5,412,526, and claims 8, 10

and 14 under 35 USC 103a as being unpatentable over Chaudhry in view of Stahl U.S. 5,388,021.

In response to this office action, the applicant has amended the pending independent claims to recite that the surge protector is a shunting type surge protector wherein "surges are shunted to the building ground through a metal-oxide varistor and gas-discharge tube". The applicant believes that this modification distinguishes the pending claims over the cited Chaudhry reference, a reference which is directed towards the creation of a "virtual ground" in a series type surge suppressor. The Chaudhry reference is a series surge protector due to the fact that all of the currents pass through a fuse (12 in fig 1) or a circuit breaker (34 in figs 2 and 3) in order to provide for overcurrent protection (col 2 lns 40-41, col 3 lns 36-38). See also the attached Declaration of Dr. Richard Cohen differentiating between a shunting surge protector as set forth in the present application and the series type Chaudhry U.S. 6,188,557.

In respect to the virtual ground, the Chaudhry invention is specifically set forth as used in situations where there is no actual ground - in specific two wire AC circuits (see for example col 1 ln 10, lns 53-58). The invention is the addition of additional components in order to create a "virtual ground" (see for example col 1 lns 58-60, col 2 lns 63-65, col

3 ln 55, col 4 lns 50-52, etc.). This type of device is used specifically in circuits which only have two prong AC plugs (col 1 lns 41-42, 50, col 2 lns 35-39, col 40 ln 13, etc.). Indeed, the claimed invention of Chaudhry relates to a virtual ground circuit (col 6 lns 5+, 30+). This virtual ground creates a return path "to" the two wire AC power source through which voltage surges appearing on the "coaxial transmission lines" may be directed (col 1 ln 58-60) in addition to a "virtual ground" for the ground conductor of receptacle 13 (col 2 lns 34-39). The device thus provides overvoltage protection to the coaxial transmission line by the creation of a virtual ground (col 2 lns 43-55, 64-67). The surges are said to flow "to" either line 1 or line 2 of the AC circuit depending on which has the lower potential (col 3 lns 1-2).

As Chaudhry's invention relates to the components which make up this "virtual ground" specifically in the absence of any real ground, the applicant does not believe that their inclusion in a series protector could be said to render the shunting claims of the present application obvious.

As all of the claims are based on a rejection including the Chaudhry reference as the primary reference, and as is believed that the present invention distinguishes over the Chaudhry reference, it is believed that the pending claims are in condition for allowance.



Claims 15-18 are being added in this amendment. These claims draw further upon the series connection of the metal-oxide varistor (MOV) and a gas-discharge tube (GDT) between the power line and building ground in a shunt type surge protector (see for example appln pg 3 lns 7-10) and the particular protector sub-circuit utilized for each pertinent phase (see for example appln pg 3 lns 21-28).

The claimed shunt protector has an improved turn-on voltage, surge limiting, lower cost and increased service life re alternative designs (pg 4 lns 10-20).

Favorable action is solicited.

Respectfully solicited,

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